Chapter 3O. Affected Environment and Environmental Consequences - Air Quality

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SUMMARY

This chapter discusses air quality on and near the DW project islands and analyzes the impacts on air quality conditions in project area air basins that could result from implementation of the DW project alternatives. The pollutants studied for this analysis are carbon monoxide (CO), ozone precursors (reactive organic gases [ROG] and oxides of nitrogen [NO_x]), and particulate matter smaller than 10 microns in diameter (PM10).

Construction and operation under Alternative 1, 2, or 3 would result in significant increases in emissions of ROG and NO_x, and construction under Alternative 1, 2, or 3 would result in significant increases in PM10. The following mitigation measures would reduce construction impacts, but not to less-than-significant levels: perform routine maintenance on construction equipment, require borrow sites to be chosen closest to fill locations, prohibit unnecessary idling of construction equipment engines, and implement construction practices that reduce generation of particulate matter. Recreation-generated vehicle and boat trips would be the primary source of air pollutant emissions during project operations. There are no mitigation measures to reduce these project operation impacts to a less-than-significant level. To partially reduce project operation impacts, DW should coordinate with the local air districts to implement measures that would reduce or offset DW project air emissions. Because the feasibility and effectiveness of those measures are not known, these impacts are considered significant and unavoidable. However, if the project description were modified to reduce the number of recreation facilities built on the DW project islands, this impact could be reduced to a less-than-significant level.

Implementation of Alternative 1, 2, or 3 would result in increases in CO emissions during project construction and operation. Because the project area is a CO attainment area under state and federal standards, these changes in CO generation are considered less than significant. However, mitigation measures are recommended for the construction period to reduce the quantity of CO generated.

Under DW project operation, the reduction in agriculture-related activities would result in a beneficial decrease in PM10 emissions.

Operation of the No-Project Alternative includes intensified agricultural activity with some increase in recreational uses. Implementation of the No-Project Alternative would result in increases in CO, ROG, NO_x, and PM10 emissions.

Implementation of Alternative 1, 2, or 3 in conjunction with cumulative development and increased recreational use of the Delta would contribute to the cumulative production of ozone precursors (ROG and NO_x) and CO in the Delta. This cumulative impact is considered significant and unavoidable.

AFFECTED ENVIRONMENT

Sources of Information

All information on air quality used in this analysis was collected in preparation of this document; the 1990 draft EIR/EIS did not contain a chapter on air quality. This section describes the air quality environment in the DW project vicinity at the time this draft EIR/EIS was prepared. The information used to describe these existing air quality conditions was derived from many sources, including the California Air Resources Board (ARB), the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD), and the Bay Area Air Quality

Management District (BAAQMD). Federal and state ambient air quality standards are described below for each pollutant to provide the context for the discussion of existing air quality conditions in the project area. However, as explained below under "Criteria for Determining Impact Significance", these standards will not be used as part of the significance criteria.

Information on sulfur dioxide was not included in this chapter because sulfur dioxide is emitted primarily by industrial sources and is not considered to be a pollutant of concern in the DW project area, which is in attainment with state and federal standards for sulfur dioxide. Nitrogen dioxide is included in the group of pollutants discussed in this chapter as NO_x. Nitrogen dioxide is usually not discussed separately from other NO_x compounds in analyses of nonindustrial projects because high nitrogen dioxide concentrations are most often associated with industrial combustion sources.

Regional Geography, Topography, and Climate

Two of the DW project islands, Bacon and Bouldin Islands, are located in San Joaquin County, which is in the San Joaquin Valley Air Basin (SJVAB); the other two project islands, Holland and Webb Tracts, are in Contra Costa County, which is in the San Francisco Bay Area Air Basin (SFBAAB).

The project islands are all located in the Delta, a flat, sea-level area with moderate temperatures and rainfall. The Delta is upwind from major population centers in the Sacramento Valley Air Basin and the SJVAB. Pollutants generated in the Delta are transported to these areas, which already tend to experience high levels of pollution. The Delta, in turn, receives pollutant transport from the Bay Area.

Carbon Monoxide

Federal and State Air Quality Standards

CO is a public health concern because it combines readily with hemoglobin, reducing the amount of oxygen transported to the bloodstream. CO binds to hemoglobin 200-250 times more strongly than oxygen. Thus, relatively low concentrations of CO can significantly affect the amount of oxygen in the bloodstream. Both the cardiovascular system and the central nervous system can be affected when 2.5%-4.0% of the hemoglobin in the bloodstream is bound to CO rather than to oxygen. The state and federal ambient air quality standards have been set at levels to keep CO from combining with more than 1.5% of the blood's hemoglobin (EPA 1979, ARB 1982). CO is of concern primarily during winter, when vehicle-related emissions are greatest and atmospheric stability allows the buildup of high CO concentrations.

State and federal CO standards have been set for both 1-hour and 8-hour averaging times. The average CO level measured over any 1-hour period is not to exceed the 1-hour standards, and the average CO level measured over any 8-hour period is not to exceed the 8-hour standards. The state 1-hour CO standard is 20 parts per million (ppm), and the federal 1-hour standard is 35 ppm. The state and federal 8-hour standards are both 9 ppm. State CO standards are phrased as values not to be exceeded. Federal CO standards are phrased as values not to be exceeded more than once per year.

Existing Air Quality Conditions

Air Quality Monitoring Data. Within the SJVAB, only the metropolitan area of Fresno is a nonattainment area for CO under both federal and state standards. The metropolitan areas of Bakersfield, Modesto, and Stockton are nonattainment areas under federal standards. The remaining portions of the SJVAB, including Bacon and Bouldin Islands, are in attainment under state and federal CO standards.

Within the SFBAAB, only the urban portion of Santa Clara County is a nonattainment area for CO under state standards. The remaining portions of the SFBAAB, including Holland and Webb Tracts, are in attainment of the state CO standards. All urban portions of all counties in the SFBAAB are nonattainment areas for CO under federal standards. The remaining portions of the SFBAAB, including the DW project area, are in attainment under the federal CO standards. The BAAQMD has submitted a request to redesignate federal CO nonattainment areas in the SFBAAB as CO maintenance areas (Marshall pers. comm.).

Table O1-1 in Appendix O1, "Air Quality Monitoring Data and Pollutant Emissions under Existing Conditions and the Delta Wetlands Project Alternatives", shows air quality monitoring data for CO for 1989-1993. Data are included for all monitoring stations in Contra Costa and San Joaquin Counties; however, few of the monitoring stations are located near the DW project area. Only the Delta monitoring stations, at Bethel Island Road and Pittsburg in Contra Costa County, are discussed in this chapter.

As shown in Table O1-1, the highest 1-hour CO concentration at the Bethel Island Road station during 1989-1993 was 5.0 ppm and occurred in 1993. The highest 8-hour CO concentration was 3.9 ppm and occurred in the same year. There were no days with CO concentrations over the state and federal standard of 9.0 ppm at this station during this period.

The highest 1-hour CO concentration at the Pittsburg station during 1989-1993 was 12.0 ppm and occurred in 1989. The highest 8-hour CO concentration was 4.8 ppm and occurred in the same year. There were no days with CO concentrations over the state and federal standard of 9.0 ppm at this station during this period.

Existing Emissions on the DW Project Islands. As shown in Table 3O-1, approximately 1,554 pounds of CO are being emitted each day on the DW project islands as a result of existing agricultural and recreational activities (see Appendix O1 for more detailed information regarding existing CO emissions). This estimate was derived using the methods described below that were used to estimate project-related emissions.

Ozone

Federal and State Air Quality Standards

Ozone is a public health concern because it is a respiratory irritant that increases human susceptibility to respiratory infections. Ozone can cause significant damage to leaf tissues of crops and natural vegetation and can damage many materials by acting as a chemical oxidizing agent.

Ozone is of concern primarily during summer when high temperatures, the presence of sunlight, and an atmospheric inversion layer induce photochemical reactions that convert ROG and NO_x into ozone. Because ozone is not emitted directly into the atmosphere, but is created by reactions of these ozone precursors in the presence of sunlight, emissions of ROG and NO_x are estimated in this chapter as a way of assessing potential for ozone generation.

State and federal standards for ozone have been set for a 1-hour averaging time. The state 1-hour ozone standard is 0.09 ppm, not to be exceeded. The federal 1-hour ozone standard is 0.12 ppm, not to be exceeded more than three times in any 3-year period.

Existing Air Quality Conditions

Air Quality Monitoring Data. The SJVAB and SFBAAB are both nonattainment areas for ozone under state standards. The SJVAB is also a nonattainment area for ozone under federal standards. SFBAAB is an ozone maintenance area under federal standards (Marshall pers. comm.).

Table O1-2 in Appendix O1 shows air quality monitoring data for ozone for 1989-1993. As shown in Table O1-2, the highest 1-hour ozone concentration at the Bethel Island Road station in this 4-year period was 0.12 ppm and occurred in 1990. There were 29 days with ozone concentrations over the state standard of 0.09 ppm at this station during this period. The federal standard of 0.12 ppm was not exceeded at this station during 1989-1993.

The highest 1-hour ozone concentration at the Pittsburg station during 1989-1993 was 0.13 ppm and occurred once in 1993. There were 16 days with ozone concentrations over the state standard of 0.09 ppm at this station during this 5-year period.

Existing Emissions on the DW Project Islands. As shown in Table 3O-1, approximately 116 pounds of ROG and 459 pounds of NO_x, the ozone precursors, are being emitted each day on the DW project islands as a result of existing agricultural and recreational activities (see Appendix O1 for more detailed information regarding existing ROG and NO_x emissions). These estimates were derived using the methods described below for estimating project-related emissions.

PM10

Federal and State Air Quality Standards

At one time, the federal and state particulate matter standards applied to a broad range of particle sizes. The high-volume samplers used at most monitoring stations were most effective in collecting particles smaller than 30 microns in diameter (1 micron is equal to about 0.00004 inch) (Powell 1980). Health concerns associated with suspended particles focus on those particles small enough to reach deep into the lungs when inhaled. Few particles larger than 10 microns in diameter reach the lungs. Consequently, both the federal and state air quality standards for particulate matter were revised to apply only to these small particles (generally designated as PM10).

State standards for inhalable particulate matter have been set for two periods, a 24-hour average and an annual geometric mean of the 24-hour values; federal standards have been set for a 24-hour average and an annual arithmetic mean of the 24-hour values. (See Appendix O1, "Air Quality Monitoring Data and Pollutant Emissions under Existing Conditions and the Delta Wetlands Project Alternatives", for a description of the geometric and arithmetic means.) The state PM10 standards are 50 micrograms per cubic meter ($\mu g/m^3$) as a 24-hour average and 30 $\mu g/m^3$ as an annual geometric mean. The federal PM10 standards are 150 $\mu g/m^3$ as a 24-hour average and 50 $\mu g/m^3$ as an annual arithmetic mean.

Existing Air Quality Conditions

Air Quality Monitoring Data. The SJVAB and the SFBAAB are both nonattainment areas for PM10 under state standards. The SJVAB is also a nonattainment area for PM10 under federal standards, and the SFBAAB is an unclassified area, with pending redesignation as a nonattainment area, under federal standards (Marshall pers. comm.).

Table O1-3 in Appendix O1 shows air quality monitoring data for PM10 for 1989-1993. As shown in Table O1-3, the highest 24-hour PM10 concentration at the Bethel Island Road station during this 5-year period was 141.0 $\mu g/m^3$ and occurred in 1990. There were 30 days with PM10 concentrations over the state standard of 50 $\mu g/m^3$. The federal standard was not exceeded at this station during this period.

The Pittsburg station is not designed to monitor for PM10 concentrations.

Existing Emissions on the DW Project Islands. As shown in Table 3O-1, approximately 32,143 pounds of PM10 are being emitted each day on the DW project islands as a result of existing agricultural and recreational activities (see Appendix O1 for more detailed information regarding existing PM10 emissions). This estimate was derived using the methods described below for estimating project-related emissions.

Air Quality Management Programs

State

The California Clean Air Act requires that an air quality attainment plan be prepared for areas that violate air quality standards for CO, sulfur dioxide, nitrogen dioxide, or ozone. No locally prepared attainment plans are required for areas that violate state PM10 standards. PM10 attainment issues are being addressed by the ARB. The air quality attainment plan requirements established by the California Clean Air Act are based on the severity of air pollution problems caused by locally generated emissions. Upwind air pollution control districts are required to establish and implement emission control programs commensurate with the extent of pollutant transport to downwind districts.

The SJVUAPCD's 1991 Air Quality Attainment Plan was approved by the ARB in January 1992. The BAAQMD prepared a Clean Air Plan that was approved in 1991 and submitted an update of its air quality attainment plan to the ARB in 1994. This update has been verbally approved by ARB and written approval is expected by January 1996.

Federal

The federal Clean Air Act mandated the establishment of ambient air quality standards and requires areas that violate those standards to prepare and implement plans to achieve the standards. These plans are called State Implementation Plans (SIPs). A separate SIP must be prepared for each nonattainment pollutant. Although the SFBAAB is currently awaiting redesignation of its CO nonattainment areas as CO maintenance areas, it does have a SIP for CO. This SIP is not truly applicable, however, because the CO standards included in that plan have already been achieved (Marshall pers. comm.). SIPS for CO, ozone, and PM10 have been prepared for the SJVAB but they have not yet been approved by EPA (Stagnaro pers. comm.).

Consistency with Local Air Quality Management Programs

According to the BAAQMD, there are no aspects of the DW project that would cause it to be inconsistent with the BAAQMD's 1991 Clean Air Plan or the 1994 update (Steinberger and Marshall pers. comms.). According to the SJVUAPCD, the DW project would not be inconsistent with the SJVUAPCD 1991 Air Quality Attainment Plan if the project includes all the mitigation measures for construction-related PM10 emissions outlined in Rule 8020 of SJVUAPCD Regulation 8 (Stagnaro pers. comm.). Rule 8020 requires that the following actions be taken to minimize PM10 emissions at construction sites (SJVUAPCD 1993):

- All disturbed areas of a construction site, including storage piles of fill dirt and other bulk materials that are not being actively used for a period of 7 days or more shall be stabilized using water, chemical dust stabilizers, or planting of vegetation. Application of the stabilizing material must effectively stabilize the disturbed area and limit visible dust emissions.

- Appropriate dust control measures must be utilized during land preparation, demolition, excavation, or extraction. Appropriate dust control measures may consist of effective application of water or pre-soaking.

- Visible dust emissions from onsite unpaved roads and offsite unpaved access roads must be effectively limited using water or chemical dust stabilizers or suppressants.

- Mud and dirt must be removed from paved public roads, including shoulders, adjacent to the construction site. The use of dry rotary brushes or blower devices for this purpose is expressly prohibited. Additionally, the use of paved access aprons, gravel strips, and wheel washers is strongly encouraged to minimize the need for removal of mud and dirt from paved public roads.

- All areas used for storage of construction vehicles, equipment, and materials shall comply with the measures described above.

Because the actions described above have been included in construction mitigation for each of the DW project islands where appropriate, the project would not be inconsistent with the SJVUAPCD 1991 Air Quality Attainment Plan.

Conformity with State Implementation Plans

Projects involving federal funding or federal approval are required to show conformity with EPA's general conformity rule if they would result in emission of over a certain amount of nonattainment pollutants. These pollutant threshold levels, called "de minimis" emission levels, vary from pollutant to pollutant and depend on the attainment status of individual air basins. As discussed above, pollutants for which the DW project area is in nonattainment are ozone (formed by ROG and NO_x in the presence of sunlight) and PM10. According to EPA, the applicable de minimis levels for this project are 100 tons per year (tpy) of ROG, 50 tpy of NO_x, and 70 tpy of PM10. Tables 3O-2 and 3O-3 show the results of conformity screening for Alternatives 1 and 3, respectively.

IMPACT ASSESSMENT METHODOLOGY

Under existing conditions, emissions are generated by agricultural and recreational activities. Under Alternatives 1, 2, and 3, emissions would be generated during activities associated with construction of facilities (i.e., transport of employees and materials to the islands, rock placement, and earthmoving) and operation (i.e., discharge pump operation, recreational activities, and agricultural activities). Under the No-Project Alternative, emissions would be generated by agricultural and recreational activities that would be expected to occur on the islands if the DW project is not implemented.

Analytical Approach and Impact Mechanisms

This section describes the methods used to estimate CO, ROG, NO_x, and PM10 emissions generated by construction, operation, and agricultural activities under the DW project alternatives, as well as under existing conditions. Maintenance activities, consisting of boat and maintenance vehicle trips to the project islands, were assessed in preliminary stages of the analysis. Few vehicle and boat trips are associated with maintenance, and in general, these constitute a minor component of pollutant emissions associated with the DW project. Because vehicle and boat trips are the only activities associated with emissions during maintenance, maintenance-related emissions contribute a negligible fraction of operation-related emissions, and therefore are not considered further in this chapter. The methods described below were designed to estimate pollutant emissions for the worst-case scenario, under which all activities assessed for a given condition would occur simultaneously.

Construction-Related Emissions

Construction-related emissions were calculated only for Alternatives 1 and 3 because project-related construction does not occur under existing conditions and would not occur under the No-Project Alternative. Additionally, emissions generated during construction under Alternative 2 would be the same as the emissions generated during construction under Alternative 1.

The average amount of CO, ROG, NO_x, and PM10 that would be emitted on each island during each day of construction was calculated based on the average number of vehicle and boat trips expected to take place per day, as well as the number of hours of rock placement and the number of cubic yards of earth moved per day during the construction period (Forkel and Stewart pers. comms.). It should be noted that the boat trips included in this analysis are not ferry trips, but are trips made by private boats. Additionally, all trips referred to in this chapter, as well as in the traffic chapter, are one-way trips, rather than round trips.

The total number of hours of rock placement that would take place and the total amount of earth that would need to be moved on each DW project island were each divided by 375, to represent the average amount of these activities that would take place on each day of construction during the 1.5-year construction period. It was assumed that there would be 250 days of construction each year, for a total of 375 construction days in a 1.5-year period, except on Bouldin Island under Alternative 3, in which case the construction period was assumed to be 2.5 years, or 625 days.

The average number of hours of rock placement expected to occur per day was multiplied by emission rates for cranes taken from the EPA document Compilation of Air Pollution Emission Factors, also known as AP-42 (EPA 1985), to calculate the average amount of each pollutant emitted by rock placement cranes during each day of construction on each DW project island (see Tables O1-8 through O1-15 in Appendix O1). A similar process was applied to the average number of cubic yards of earth moved per day on each island. The average number of vehicle and boat trips expected to occur each day on each island was multiplied by emission rates taken from AP-42 to calculate the average amount of each pollutant emitted by construction vehicles and boats during each day of construction on each island (see Tables O1-8 through O1-15 in Appendix O1).

In addition to combustion-related emissions of PM10, PM10 emissions generated through construction-related ground disturbance were estimated through multiplication of the total acreage of each DW project island by a ground-disturbance PM10 emission rate taken from AP-42. It was assumed that an estimate based on each acre being disturbed once would approximate the actual practice of some acres being disturbed numerous times and others being left undisturbed.

Operation-Related Emissions

Three different activities, water pumping, recreation, and agriculture, are associated with operation of the DW project. The methods used to assess pollutant emissions resulting from these activities are described below.

Pumping. Emissions generated during pumping were calculated only for Alternatives 1 and 3 because discharge pumping of stored water is not conducted under existing conditions and would not occur under the No-Project Alternative. Although the amount of discharge under Alternative 2 would be slightly different from the amount of discharge under Alternative 1, Alternative 2 is similar enough to Alternative 1 that little variation in pumping emissions is expected to occur. It should be noted that the project's pumps are likely to be electrically powered but may instead be diesel fueled. This analysis assesses the worst-case scenario (i.e., that the pumps would be diesel fueled). If electric pumps are used, no pollutant emissions would be generated by pumping.

The average amount of CO, ROG, NO_x, and PM10 emitted each day by diesel pumps discharging water from the DW project islands was calculated based on the total DW discharge for export shown in Tables 3A-6 and 3A-10 of Chapter 3A, "Water Supply and Water Project Operations", for Alternatives 1 and 3, respectively. This amount of water was multiplied by an average fuel consumption rate per acre-foot of water pumped to calculate the total amount of fuel needed to pump water from each island annually (Forkel pers. comm.). This annual amount of fuel consumption was divided by 365 to represent the amount of fuel needed to pump the average volume each day. Although the amount of water pumped per day would vary from year to year and month to month, in order to determine an average amount of emissions generated per day, pumping was assumed to be evenly distributed throughout the year. The average daily fuel consumption for pumping was then multiplied by diesel fuel combustion emission rates taken from AP-42 to calculate the average amount of each pollutant emitted on each island during each day of discharge (see Tables O1-8 through O1-15 in Appendix O1). It should be noted that although there would be a minimal amount of water storage on the habitat islands under Alternatives 1 and 3, the amount of pumping would not be sufficient to cause a noticeable effect on discharge-related emissions.

Operation of the siphon booster pumps was not included in this analysis because these pumps are small and would only be used in the event that gravity fails to successfully divert water onto the DW project islands. Emissions from the booster pumps are expected to be minimal, especially when compared with emissions generated during discharge.

Recreation. Recreation-related air pollutant emissions were calculated for existing conditions, Alternative 1, Alternative 3, and the No-Project Alternative. Recreation-related emissions for Alternative 2 would be almost identical to recreation-related emissions for Alternative 1.

The impact analysis compared recreation-related emissions estimated for the peak recreation season under each alternative with emissions for the peak season under existing conditions. Trip generation estimates for recreation-related vehicle and boat use for all seasons of recreational activity (see Table 3L-5 in Chapter 3L, "Traffic") were used to determine the season with the greatest amount of recreational trip generation. The trip generation estimates are described in the following sections.

Under existing conditions and the No-Project Alternative, the hunting season would be the peak recreation season (see Chapter 3J, "Recreation and Visual Resources"). Therefore, peak emissions generated by recreational activities under existing conditions and the No-Project Alternative were estimated based on estimates of hunting activities during the hunting season. Under Alternatives 1 and 3, summer would be the peak recreation season (see Chapter 3J). Boating, fishing, hunting, and other miscellaneous recreational activities were included in the analysis of trip generation for recreation, as described below. However, because summer is the peak recreation season assessed for the air quality impact analysis for Alternatives 1 and 3, hunting is not included as a source of recreation-related emissions for the peak use impact assessment for these alternatives because hunting would not occur during summer.

Existing Conditions and the No-Project Alternative. Hunting-related vehicle trips were estimated for existing conditions and the No-Project Alternative using the number of annual hunter use-days expected on the DW project islands (Table 3J-2 in Chapter 3J, "Recreation and Visual Resources"). One hunter use-day represents participation by one individual in hunting activities for any portion of a 24-hour period. The following assumptions were used to determine annual hunting-related vehicle trips:

- Hunters would not stay overnight; therefore, each hunter use-day represents one hunter.
- Vehicle occupancy would be two people per vehicle.
- Each vehicle would make two trips (one trip to the island and one trip back).

The annual number of vehicle trips was then divided by the number of days that hunting is or would be allowed in a year, giving the average number of recreation-related vehicle trips occurring per day during the hunting season. The number of days hunting would be allowed during the year was assumed to be the same for existing conditions and the No-Project Alternative, as shown for the No-Project Alternative in Table 3J-16. To calculate recreation-related emissions for existing conditions and the No-Project Alternative, the average number of vehicle trips expected to occur during the hunting season was multiplied by automobile emission rates taken from AP-42 (see Tables O1-4 through O1-7 and O-16 through O-19).

Alternatives 1 and 3. Hunting-related vehicle trip generation for Alternatives 1 and 3 was estimated in the same manner as for existing conditions. However, the DW project alternatives would include lodging facilities for hunters; therefore, the number of hunters was estimated based on the following assumptions: an overnight hunter accounts for two hunter use-days, 70% of the hunters would stay overnight at the project facilities, and the remaining 30% of the hunters would come for day use only. Also, it was assumed that 10% of the hunters using Webb Tract would travel by private boats and would not use the ferry.

Estimates of annual hunter use-days shown in Table 3J-11 in Chapter 3J were used for the trip generation analysis for Alternatives 1 and 3. These numbers represent the maximum amount of hunting that would occur during the approximately 5- to 15-year period following project start-up. After this initial period, hunting activity on the DW project islands is expected to decrease. These maximum numbers were used for a worst-case analysis. Additionally, the number of days that hunting would be allowed in future years under each alternative was taken from Tables 3J-3, 3J-4, 3J-12, 3J-13, 3J-14, 3J-15, and 3J-16 in Chapter 3J. Depending on the alternative and the island under consideration, days on which hunting would be allowed varied from 47 to 86.

Hunting also would result in boating on the interior of the project islands under Alternatives 1 and 3. Trip generation for hunting-related boating was estimated based on the number of hunters expected to use the project islands each day, assuming an occupancy of two people per boat. This activity is not considered a part of pleasure boating activities, which would take place in the Delta on the exterior of the DW project islands. Additionally, hunting-related boat trips would be much shorter in duration, and boats used for hunting are smaller than pleasure boats.

Boating activity associated with Alternatives 1 and 3 would result in both vehicle traffic and boat traffic. Trip generation for boating-related boats and vehicles for Alternatives 1 and 3 was estimated for each season using peak-use estimates for each season. Boat berths that would be constructed under the DW project alternatives are projected to have an average boat occupancy rate of 70% (see Chapter 3J, "Recreation and Visual Resources"). Estimates of the percentage of docked boats that are used on a peak day were used to estimate the total number of boats that would be used per peak day for each season under Alternatives 1 and 3. Estimates were based on the assumptions that each boat would complete two trips each day, and that the occupancy rate would be three people per boat.

The numbers of boating-related vehicle trips under Alternatives 1 and 3 were calculated based on the numbers of boaters (assuming three boaters per boat), the number of peak-day boat trips, and an occupancy rate of two people per car. Therefore, the number of boating-related vehicle trips would be 1.5 times the number of boat trips during every season except hunting season. Because 5% of the hunters are assumed to engage in pleasure boating, 5% of the hunting-related vehicle trips were subtracted from the boating-related vehicle trips during the hunting season.

Generation of vehicle trips related to other recreational activities under Alternatives 1 and 3 was estimated for each season using the number of recreationists other than boaters or hunters expected to use each island. This number was estimated in relation to the number of boaters expected to use the islands. See Chapter 3J, "Recreation and Visual Resources", for further explanation of this estimate. It was assumed that 90% of these recreationists would drive to the islands or, in the case of Webb Tract, to the ferry. A vehicle occupancy of two people per car was assumed.

To calculate recreation-related emissions for Alternatives 1 and 3, the number of vehicle and boat trips expected to occur during summer under each alternative was multiplied by automobile and boat emission rates taken from AP-42 (see Tables O1-8 through O1-15).

Agriculture. Agricultural emissions were calculated for existing conditions and conditions under Alternative 1 and the No-Project Alternative. Agricultural emissions under Alternative 2 would be identical to agricultural emissions under Alternative 1. No agricultural use of the DW project islands is expected to occur under Alternative 3; therefore, no agricultural emissions were estimated for that alternative.

Agricultural emission calculations were divided into two categories: emissions generated by agricultural equipment, nonharvest vehicles, and agricultural boats and emissions generated by harvest vehicles. Agricultural equipment is used for activities such as harvesting and tilling. Harvest vehicles are used to deliver harvested crops. Nonharvest vehicles are used for all other farm-related trips. It should be noted that the boat trips included in this analysis are not ferry trips but are trips made by private boats. See Tables O1-4 through O1-19 for calculations of agricultural emissions.

Existing Conditions. To calculate emissions generated by agricultural equipment, nonharvest vehicles, and agricultural boats under existing conditions, the average daily gas and diesel consumption by agricultural equipment, nonharvest vehicles, and agricultural boats on the DW project islands was multiplied by fuel-combustion emission rates taken from AP-42. It was assumed that agricultural activities are conducted approximately 250 days per year on the DW project islands (Forkel pers. comm.). Therefore, the total amount of gas and diesel fuel consumed annually by agricultural equipment, nonharvest vehicles, and agricultural boats on each island under existing conditions was divided by 250, giving the estimated average amount of fuel consumed per day.

In addition to the emission calculations described above, further calculations were needed to determine the quantity of PM10 that would be generated through ground disturbance caused by agricultural equipment. This quantity was estimated by multiplying the total acreage farmed under existing conditions by a ground-disturbance factor, then multiplying by a ground-disturbance PM10 emission rate taken from AP-42. The ground-disturbance factor is equal to the average number of times an acre of active farmland is expected to be disturbed per year, which was assumed to be five, representing tilling, seeding, two episodes of weeding, and harvesting. It should be noted that ground disturbance is the greatest source of PM10 emissions in the project area under any condition.

To calculate emissions generated by harvest vehicles under existing conditions, the average daily number of existing harvest vehicle trips occurring on the DW project islands was multiplied by emission rates taken from AP-42.

No-Project Alternative. To calculate all emissions, including ground-disturbance PM10 emissions, generated by agricultural equipment, nonharvest vehicles, and agricultural boats under the No-Project Alternative, the quantities of such emissions under existing conditions were multiplied by a production factor. This production factor is equal to the amount of agricultural production expected to occur under the No-Project Alternative divided by the amount of agricultural production occurring under existing conditions. The amount of agricultural production expected to occur under the No-Project Alternative was taken from Table 3I-10 and the amount of agricultural production occurring under existing conditions was taken from Table 3I-6 in Chapter 3I, "Land Use and Agriculture". For more information on the agricultural analysis, see Chapter 3I.

To calculate emissions generated by harvest vehicles under Alternative 1, the quantity of such emissions under existing conditions was multiplied by the acreage factor discussed below.

Alternative 1. To calculate all emissions, including ground-disturbance PM10 emissions, generated by agricultural equipment, nonharvest vehicles, and agricultural boats under Alternative 1, the quantities of such emissions under existing conditions were multiplied by an acreage factor. An acreage factor is used for this calculation rather than a production factor because no information was available regarding the amount of crop production expected to occur under Alternative 1. This acreage factor is equal to the number of acres expected to remain in conventional agricultural use under Alternative 1, which is 1,120 acres on Holland Tract, divided by the number of acres farmed under existing conditions on Holland Tract. There would be no land used for conventional agriculture on the other islands under Alternative 1. The number of acres expected to remain in conventional agricultural use under Alternative 1 was taken from the text of Chapter 3I, and the number of acres farmed under existing conditions on Holland Tract was taken from Table 3I-6.

An additional type of agriculture, habitat-related farming, would take place under Alternative 1; this agricultural use does not currently occur and would not occur under the No-Project Alternative. Habitat-related farming would be an additional source of ground-disturbance PM10 emissions. Because habitat-related farming would not be very intensive, vehicle emissions associated were considered negligible and were not included in this analysis. The following information on the amount and type of habitat-related farming that would take place under Alternative 1 was taken from Appendix G3, "Habitat Management Plan for the Delta Wetlands Habitat Islands".

The most intensive types of habitat-related farming activity were considered: corn and wheat in rotation, small grains, pasture, and seasonal wetland. For corn and wheat rotation and small grains, it was assumed that the ground would be disturbed approximately three times a year for tilling, seeding, and harvesting. For pasture, it was assumed that the ground would rarely be disturbed. For seasonal wetland, it was assumed that the ground would be disturbed approximately once each year for disking and seeding. To determine habitat-related farming PM10 emissions, the acreages that would be used for these various purposes were multiplied by the number of disturbances expected per year and the product was then multiplied by a ground-disturbance PM10 emission factor taken from AP-42.

To calculate emissions generated by harvest vehicles under Alternative 1, the quantity of such emissions under existing conditions was multiplied by the acreage factor discussed above.

Local Permitting Requirements

The DW project would involve the use of several discharge pumps to move water from the islands to destinations determined by purchasers. These pumps are likely to be electrically powered but may be diesel fueled. This analysis assumes the worst-case scenario (i.e., that the pumps are diesel fueled).

The SJVUAPCD requires that a permit be obtained for any engine over 50 brake horsepower (bhp) that is fueled by diesel or natural gas unless that pump is portable and would be used for less than 6 months consecutively in the same spot (Stagnaro pers. comm.). Such a portable pump would need to be registered with the SJVUAPCD in accordance with its portable equipment registration rule. Discharge pumps for the project include both permanently installed 200-hp pumps and portable 200-hp pumps that would not be used for more than 6 months consecutively in the same spot (Forkel pers. comm.). Portable pumps used on Bacon and Bouldin Islands would need to be registered with the SJVUAPCD and permits would be needed for the permanent pumps on Bacon and Bouldin Islands. If electricity is used to power these pumps instead of diesel fuel, neither registration nor permitting would be required.

The BAAQMD does not require permits for internal combustion engines of less than 250 hp unless they would emit more than 150 pounds per day (ppd) of any pollutant. All discharge pumps for the DW project would have 200-hp engines; however, the discharge pumps on Holland and Webb Tracts would each emit 107 ppd of NO_x under Alternative 3, for a total of 214 ppd (see Appendix O1, Table O1-14). Under Alternative 1, there would be no discharge pumps on Holland Tract, but approximately 143 ppd of NO_x would be emitted by discharge pumps on Webb Tract (see Appendix O1, Table O1-10). Because pump-related NO_x emissions would exceed the 150-ppd limit under Alternative 3, permits from the BAAQMD would be required for those pumps on Holland and Webb Tracts under Alternative 3 (Carter pers. comm.).

Criteria for Determining Impact Significance

Significant Impacts

Because project-related pollution cannot be quantified in terms of concentration (ppm), it is quantified in terms of absolute amount (ppd). Therefore, significance must be determined based on threshold quantities in ppd, as determined by the air districts, rather than on state and federal standards, which are expressed in ppm.

New Source Review (NSR) thresholds represent the absolute amount of a pollutant that a new source is allowed to emit. In the SJVUAPCD, formal thresholds have not yet been developed. In the interim, the following thresholds are being used to assess significance: 55 ppd of ROG, 55 ppd of NO_x, and 82 ppd of PM10 (Stagnaro pers. comm.). In the BAAQMD, the established thresholds of significance are 150 ppd of ROG, 150 ppd of NO_x, and 150 ppd of PM10 (BAAQMD 1985).

Because of the proximity of the four islands, the most conservative set of pollutant thresholds, those recommended for use by the SJVUAPCD, are used for determining impact significance. Therefore, to constitute a significant impact, a project alternative must generate more ROG, NO_x, or PM10 than is generated under existing conditions by an amount exceeding 55 ppd of ROG, 55 ppd of NO_x, or 82 ppd of PM10. These thresholds have been applied in this analysis to the total amount of each pollutant generated on all four islands. Because the project area is a CO attainment area under state and federal standards, generation of CO during either construction or operation is not considered significant. However, an assessment of the quantity of CO generated by the project is included in the impact section for informational purposes.

Beneficial Impacts

For a project alternative to result in a beneficial impact, it must generate less ROG, NO_x, or PM10 than is generated under existing conditions by an amount exceeding 55 ppd of ROG, 55 ppd of NO_x, or 82 ppd of PM10. As described above, because the project area is a CO attainment area under state and federal standards, reduction in CO generation during either construction or operation is considered less than significant.

IMPACTS AND MITIGATION MEASURES OF ALTERNATIVE 1

Alternative 1 involves storage of water on Bacon Island and Webb Tract (reservoir islands), with Bouldin Island and Holland Tract (habitat islands) managed primarily as wildlife habitat. Reservoir islands would be managed primarily for water storage, with wildlife habitat and recreation constituting incidental uses. The impacts of Alternative 1 on air quality conditions in the project area are described below. In cases in which an impact is designated as significant, appropriate mitigation is recommended. Tables O1-8 through O1-11 of Appendix O1 show CO, ROG, NO_x, and PM10 emissions for Alternative 1 in detail.

Carbon Monoxide Emissions

On Bacon Island, implementation of Alternative 1 would generate 164 ppd of CO during the 1.5-year construction period and 4,848 ppd of CO during an average year of operation. On Webb Tract, implementation of Alternative 1 would generate 308 ppd of CO during the 1.5-year construction period and 4,848 ppd of CO during an average year of operation. On Bouldin Island, implementation of Alternative 1 would generate 356 ppd of CO during the 1.5-year construction period and 4,379 ppd of CO during an average year of operation. On Holland Tract, implementation of Alternative 1 would generate 68 ppd of CO during the 1.5-year construction period and 2,738 ppd of CO during an average year of operation.

Summary of Project Impacts and Recommended Mitigation Measures

Impact O-1: Increase in CO Emissions on the DW Project Islands during Construction. As shown in Table 3O-1, implementation of Alternative 1 would generate 897 ppd of CO on all four project islands during the construction period. Under existing conditions, there would be no construction-related emissions; however, daily operational emissions would continue. Although existing farming activities would gradually be phased out over the period of construction, under the worst-case scenario, existing farming activities would still be conducted. Therefore, under the worst-case scenario, there would be an increase in CO emissions of 897 ppd for all four project islands during project construction. As explained in the section on significance criteria, because the project area is a CO attainment area under state and federal CO standards, this impact is considered less than significant.

Implementing Mitigation Measures O-1, O-2, and O-3 is not required but would reduce the quantity of CO generated during construction under Alternative O-1.

Mitigation Measure O-1: Perform Routine Maintenance of Construction Equipment. During construction under Alternative 1, the primary source of CO emissions and other pollutants, including ROG and NO_x, is the exhaust generated by earthmoving equipment and other construction and transport vehicles. Therefore, DW shall require construction crews to perform routine maintenance of earthmoving equipment, as well as all other construction and transport vehicles. Routine maintenance involves oil changes and tuneups performed at least as frequently as recommended by the manufacturers. This measure shall be included as a condition of the construction contract and shall be enforced through weekly inspection by the project proponent.

Mitigation Measure O-2: Choose Borrow Sites Close to Fill Locations. The project applicant shall require construction crews to take borrow material from appropriate sites located closest to intended fill locations. This measure would reduce the overall amount of equipment and vehicle operation, thereby reducing exhaust emissions of CO and other pollutants, including ROG, NO_x, and PM10. This measure would also reduce the amount of PM10 emitted into the air by vehicles traveling over unpaved or dusty surfaces, which is the main source of PM10 emissions during construction. This measure shall be included as a condition of the construction contract and shall be enforced through weekly inspection by DW.

Mitigation Measure O-3: Prohibit Unnecessary Idling of Construction Equipment Engines. DW shall prohibit construction crews from leaving construction equipment or other vehicle engines idling when not in use for more than 5 minutes. This measure would reduce the amount of CO and other pollutants, including ROG, NO_x, and PM10, emitted in engine exhaust. This measure shall be included as a condition of the construction contract and shall be enforced through weekly inspection by DW.

Impact O-2: Increase in CO Emissions on the DW Project Islands during Project Operation. As shown in Table 3O-1, implementation of Alternative 1 would generate 16,813 ppd of CO on all four project islands during an average year of operation. Under existing conditions, approximately 1,568 ppd of CO are generated. The difference between Alternative 1 emissions and existing CO emissions is 15,245 ppd. This increase in CO emissions would result from pumping and recreational activities being increased under Alternative 1. As explained in the significance criteria section, because the project area is a CO attainment area under state and federal standards, this impact is considered less than significant.

Mitigation. No mitigation is required.

Ozone Precursor Emissions

On Bacon Island, implementation of Alternative 1 would generate 45 ppd of ROG and 281 ppd of NO_x during the 1.5-year construction period, and 931 ppd of ROG and 1,918 ppd of NO_x during an average year of operation. On Webb Tract, implementation of Alternative 1 would generate 96 ppd of ROG and 516 ppd of NO_x during the 1.5-year construction period, and 931 ppd of ROG and 1,918 ppd of NO_x during an average year of operation. On Bouldin Island, implementation of Alternative 1 would generate 139 ppd of ROG and 1,053 ppd of NO_x during the 1.5-year construction period, and 837 ppd of ROG and 1,614 ppd of NO_x during an average year of operation. On Holland Tract, implementation of Alternative 1 would generate 23 ppd of ROG and 141 ppd of NO_x during the 1.5-year construction period, and 512 ppd of ROG and 1,009 ppd of NO_x during an average year of operation.

Summary of Project Impacts and Recommended Mitigation Measures

Impact O-3: Increase in ROG Emissions on the DW Project Islands during Construction. As shown in Table 3O-1, implementation of Alternative 1 would generate 304 ppd of ROG on all four project islands during the construction period. Therefore, under the worst-case scenario, there would be an increase in ROG emissions of 304 ppd for all four project islands during project construction. This increase is greater than the 55-ppd threshold for ROG in the project area. Therefore, this impact is considered significant.

Implementing Mitigation Measures O-1, O-2, and O-3 (described above) would decrease construction-related ROG emissions, but only by less than 5% (Sacramento Metropolitan Air Quality Management District [SMAQMD] 1994). This reduction is not large enough to reduce Impact O-3 to a less-than-significant level. Therefore, this impact is considered significant and unavoidable.

Mitigation Measure O-1: Perform Routine Maintenance of Construction Equipment

Mitigation Measure O-2: Choose Borrow Sites Close to Fill Locations

Mitigation Measure O-3: Prohibit Unnecessary Idling of Construction Equipment Engines

Impact O-4: Increase in NO_x Emissions on the DW Project Islands during Construction. As shown in Table 3O-1, implementation of Alternative 1 would generate 1,991 ppd of NO_x on all four project islands during the construction period. Therefore, under the worst-case scenario, there would be an increase in NO_x emissions of 1,991 ppd for all four project islands during project construction. This increase is greater than the 55-ppd threshold for NO_x in the project area. Therefore, this impact is considered significant.

Implementing Mitigation Measures O-1, O-2, and O-3 (described above) would reduce construction-related NO_x emissions, but only by less than 5% (SMAQMD 1994). This reduction is not large enough to reduce Impact O-4 to a less-than-significant level. Therefore, this impact is significant and unavoidable.

Mitigation Measure O-1: Perform Routine Maintenance of Construction Equipment

Mitigation Measure O-2: Choose Borrow Sites Close to Fill Locations

Mitigation Measure O-3: Prohibit Unnecessary Idling of Construction Equipment Engines

Impact O-5: Increase in ROG Emissions on the DW Project Islands during Project Operation. As shown in Table 3O-1, implementation of Alternative 1 would generate 3,210 ppd of ROG on all four project islands during an average year of operation. Under existing conditions, approximately 116 ppd of ROG are generated. The difference between Alternative 1 and existing ROG emissions is 3,094 ppd. This increase in ROG emissions would be generated by pumping and recreational activities associated with Alternative 1. This increase is more than the 55-ppd threshold for ROG in the project area. Therefore, this impact is considered significant and unavoidable.

Implementing Mitigation Measure O-4 would reduce this impact, but not to a less-than-significant level. However, if the project description were modified to reduce the number of recreation facilities built on the DW project islands, this impact could be reduced to a less-than-significant level.

Mitigation Measure O-4 : Coordinate with Local Air Districts to Reduce or Offset Emissions. DW shall coordinate with the SJVUAPCD and the BAAQMD to implement measures to reduce or offset ROG and NO_x emissions of DW project operations. These measures may include implementing an air emissions offset program or a reduction credit program, as described below.

Preliminary discussions with the local air districts (Stagnaro and Marshall pers. comms.) indicate that emission offset programs may be available to DW. For example, emission reduction credits (ERCs) for stationary sources can be purchased from stationary source owners who shut down or install more emission controls than are required by their SJVUAPCD permits. Credits may also be obtained from the BAAQMD emissions bank. ERCs could be purchased from stationary source owners in the SJVAB for a price agreed upon between the source owner and DW. Another option, mobile source ERCs, can be obtained by retiring (purchasing and destroying) older vehicles. DW would be responsible for retiring the vehicles or could hire a third party to perform that function.

Impact O-6: Increase in NO_x Emissions on the DW Project Islands during Project Operation. As shown in Table 3O-1, implementation of Alternative 1 would generate 6,459 ppd of NO_x for all four project islands during an average year of operation. Under existing conditions, approximately 459 ppd of NO_x are generated. The difference between Alternative 1 and existing NO_x emissions is 6,000 ppd. This increase in NO_x emissions would be generated by pumping and recreational activities associated with Alternative 1. This increase is more than the 55-ppd threshold for NO_x in the project area. Therefore, this impact is considered significant and unavoidable.

Implementing Mitigation Measure O-4 would reduce this impact, but not to a less-than-significant level. However, if the project description were modified to reduce the number of recreation facilities built on the DW project islands, this impact could be reduced to a less-than-significant level.

Mitigation Measure O-4 : Coordinate with Local Air Districts to Reduce or Offset Emissions. This mitigation measure is described above.

PM10 Emissions

On Bacon Island, implementation of Alternative 1 would generate 1,802 ppd of PM10 during the 1.5-year construction period and 10 ppd of PM10 during an average year of operation. On Webb Tract, implementation of Alternative 1 would generate 1,800 ppd of PM10 during the 1.5-year construction period and 10 ppd of PM10 during an average year of operation. On Bouldin Island, implementation of Alternative 1 would generate 2,014 ppd of PM10 during the 1.5-year construction period and 4,331 ppd of PM10 during an average year of operation. On Holland Tract, implementation of Alternative 1 would generate 1,374 ppd of PM10 during the 1.5-year construction period and 2,635 ppd of PM10 during an average year of operation.

Summary of Project Impacts and Recommended Mitigation Measures

Impact O-7: Increase in PM10 Emissions on the DW Project Islands during Construction. As shown in Table 3O-1, implementation of Alternative 1 would generate 6,990 ppd of PM10 on all four project islands during the construction period. Therefore, under the worst-case scenario, there would be a 6,990-ppd increase in PM10 emissions for all four project islands during project construction. This increase is greater than the 82-ppd threshold for PM10 in the project area. Therefore, this impact is considered significant.

Implementing Mitigation Measures O-1, O-2, and O-3 (described above) would reduce construction-related PM10 emissions by less than 5%. Implementing Mitigation Measure O-5 (described below) would result in a reduction of approximately 37%. (SMAQMD 1994.) The combination of these reductions would not be enough to reduce Impact O-7 to a less-than-significant level. Therefore, this impact is considered significant and unavoidable.

Mitigation Measure O-1: Perform Routine Maintenance of Construction Equipment

Mitigation Measure O-2: Choose Borrow Sites Close to Fill Locations

Mitigation Measure O-3: Prohibit Unnecessary Idling of Construction Equipment Engines

Mitigation Measure O-5: Implement Construction Practices That Reduce Generation of Particulate Matter. DW shall require construction crews to implement the following measures throughout the construction period to reduce generation of particulate matter at and in the vicinity of construction sites:

- Use appropriate dust control measures, including effective application of water or presoaking, during land preparation and excavation.
- Cover or water all soil transported offsite to prevent excessive dust release.
- Sprinkle all disturbed areas, including soil piles left for more than 2 days, onsite unpaved roads, and offsite unpaved access roads, with water to sufficiently control windblown dust and dirt. Watering shall be conducted once during the morning work hours and once during afternoon work hours. The frequency of watering shall be increased to control dust if wind speeds exceed 15 mph.
- Sweep roads, including shoulders, adjacent to the project at least daily to remove silt accumulated from construction activities. The use of dry rotary brushes or blower devices for this purpose is expressly prohibited. Additionally, the use of paved access aprons, gravel strips, and wheel washers is strongly encouraged to minimize the need for removal of silt from paved public roads.
- Limit construction vehicle speeds to 15 mph on unpaved surfaces.

- Prohibit dust-producing construction activities when wind speeds reach or exceed 20 mph.

- All areas used for storage of construction vehicles, equipment, and materials shall comply with the measures described above.

These measures shall be included as a condition of the construction contract and shall be enforced through weekly inspection by the project proponent.

Impact O-8: Decrease in PM10 Emissions on the DW Project Islands during Project Operation. As shown in Table 3O-1, implementation of Alternative 1 would generate 6,987 ppd of PM10 on all four project islands during an average year of operation. Under existing conditions, approximately 32,143 ppd of PM10 are generated. The difference between Alternative 1 and existing PM10 emissions is 25,156 ppd. This decrease in PM10 emissions would result from agricultural activities being decreased under Alternative 1. This agriculture-related decrease in PM10 emissions is much more than enough to offset the increase in PM10 emissions generated by pumping and recreational activities associated with Alternative 1. Emission levels related to agricultural activities are much higher for PM10 than for other pollutants because PM10 is generated by ground disturbance as well as by fuel combustion. Furthermore, ground disturbance emits a far greater amount of PM10 than combustion does. This decrease is far greater than the 82 ppd threshold for PM10 in Alternative 1. Therefore, this impact is considered beneficial.

Mitigation. No mitigation is required.

IMPACTS AND MITIGATION MEASURES OF ALTERNATIVE 2

The only difference between Alternative 2 and Alternative 1 is the quantity and frequency of water diversions and discharges. As explained in the methodology section of this chapter, pollutant emissions generated under Alternative 2 would be identical to those under Alternative 1 for all activity categories, except pumping, where there would be a slight difference. Operation-related impacts under Alternative 2 would be significant, as under Alternative 1. It is expected that, even with the slight difference in pumping emissions, Alternatives 1 and 2 would result in the same number of unavoidable impacts. Construction-related impacts and mitigation measures of Alternative 2 would be the same as those of Alternative 1.

IMPACTS AND MITIGATION MEASURES OF ALTERNATIVE 3

Alternative 3 involves storage of water on Bacon Island, Webb Tract, Bouldin Island, and Holland Tract, with secondary uses for wildlife habitat and recreation. The portion of Bouldin Island north of SR 12 would be managed as a wildlife habitat area and would not be used for water storage. The impacts of Alternative 3 on air quality in the project area are described below. In cases in which an impact is designated as significant, appropriate mitigation is recommended. Tables O1-12 through O1-15 of Appendix O1 show CO, ROG, NO_x, and PM10 emissions for Alternative 3 in detail.

Carbon Monoxide Emissions

On Bacon Island, implementation of Alternative 3 would generate 164 ppd of CO during the 1.5-year construction period and 4,840 ppd of CO during an average year of operation. On Webb Tract, implementation of Alternative 3 would generate 308 ppd of CO during the 1.5-year construction period and 4,840 ppd of CO during an average year of operation. On Bouldin Island, implementation of Alternative 3 would generate 1,112 ppd of CO during the 2.5-year construction period and 4,402 ppd of CO during an average year of operation. On Holland Tract, implementation of Alternative 3 would generate 258 ppd of CO during the 1.5-year construction period and 3,526 ppd of CO during an average year of operation.

Summary of Project Impacts and Recommended Mitigation Measures

Impact O-9: Increase in CO Emissions on the DW Project Islands during Construction. As shown in Table 3O-1, implementation of Alternative 3 would generate 1,842 ppd of CO for all four project islands during the construction period. Therefore, under the worst-case scenario, there would be a 1,842-ppd increase in CO emissions for all four project islands during project construction. As explained above under "Criteria for Determining Impact Significance", because the project area is a CO attainment area under state and federal standards, this impact is considered less than significant.

Implementing Mitigation Measures O-1, O-2, and O-3 is not required but would reduce the quantity of CO generated during construction under this alternative.

These mitigation measures are described above under "Impacts and Mitigation Measures of Alternative 1".

Mitigation Measure O-1: Perform Routine Maintenance of Construction Equipment

Mitigation Measure O-2: Choose Borrow Sites Close to Fill Locations

Mitigation Measure O-3: Prohibit Unnecessary Idling of Construction Equipment Engines

Impact O-10: Increase in CO Emissions on the DW Project Islands during Project Operation. As shown in Table 3O-1, implementation of Alternative 3 would generate 17,608 ppd of CO on all four project islands during an average year of operation. Under existing conditions, approximately 1,554 ppd of CO would be generated. The difference between Alternative 3 and existing CO emissions is 16,054 ppd. This increase would result from CO emissions generated by pumping and recreational activities associated with Alternative 3. As explained in the section on significance criteria, because the project area is a CO attainment area under state and federal standards, this impact is considered less than significant.

Mitigation. No mitigation is required.

Ozone Precursor Emissions

On Bacon Island, implementation of Alternative 3 would generate 45 ppd of ROG and 281 ppd of NO_x during the 1.5-year construction period, and 928 ppd of ROG and 1,882 ppd of NO_x during an average year of operation. On Webb Tract, implementation of Alternative 3 would generate 96 ppd of ROG and 516 ppd of NO_x during the 1.5-year construction period, and 928 ppd of ROG and 1,882 ppd of NO_x during an average year of operation. On Bouldin Island, implementation of Alternative 3 would generate 427 ppd of ROG and 3,131 ppd of NO_x during the 2.5-year construction period, and 845 ppd of ROG and 1,721 ppd of NO_x during an average year of operation. On Holland Tract, implementation of Alternative 3 would generate 69 ppd of ROG and 244 ppd of NO_x during the 1.5-year construction period, and 677 ppd of ROG and 1,398 ppd of NO_x during an average year of operation.

Summary of Project Impacts and Recommended Mitigation Measures

Impact O-11: Increase in ROG Emissions on the DW Project Islands during Construction. As shown in Table 3O-1, implementation of Alternative 3 would generate 637 ppd of ROG for all four project islands during the construction period. Therefore, under the worst-case scenario, there would be an 637-ppd increase in ROG emissions for all four project islands during project construction. This increase is greater than the 55-ppd threshold for ROG in the project area. Therefore, this impact is considered significant.

Implementing Mitigation Measures O-1, O-2, and O-3 (described above under "Impacts and Mitigation Measures of Alternative 1") would reduce construction-related ROG emissions, but only by less than 5% (SMAQMD 1994). This reduction is not large enough to reduce Impact O-11 to a less-than-significant level. Therefore, this impact is considered significant and unavoidable.

Mitigation Measure O-1: Perform Routine Maintenance of Construction Equipment

Mitigation Measure O-2: Choose Borrow Sites Close to Fill Locations

Mitigation Measure O-3: Prohibit Unnecessary Idling of Construction Equipment Engines

Impact O-12: Increase in NO_x Emissions on the DW Project Islands during Construction. As shown in Table 3O-1, implementation of Alternative 3 would generate 4,172 ppd of NO_x on all four project islands during the construction period. Therefore, under the worst-case scenario, there would be a 4,172-ppd increase in NO_x emissions for all four project islands during project construction. This increase is greater than the 55-ppd threshold for NO_x in the project area. Therefore, this impact is considered significant.

Implementing Mitigation Measures O-1, O-2, and O-3 would reduce construction-related NO_x emissions, but only by less than 5% (SMAQMD 1994). This reduction is not large enough to reduce Impact O-12 to a less-than-significant level. Therefore, this impact is considered significant and unavoidable.

Mitigation Measure O-1: Perform Routine Maintenance of Construction Equipment

Mitigation Measure O-2: Choose Borrow Sites Close to Fill Locations

Mitigation Measure O-3: Prohibit Unnecessary Idling of Construction Equipment Engines

Impact O-13: Increase in ROG Emissions on the DW Project Islands during Project Operation. As shown in Table 3O-1, implementation of Alternative 3 would generate 3,378 ppd of ROG on all four project islands during an average year of operation. Under existing conditions, approximately 116 ppd of ROG are generated. The difference between Alternative 3 and existing ROG emissions is 3,262 ppd. This increase in ROG emissions would be generated by pumping and recreational activities associated with Alternative 3. This increase is greater than the 55-ppd threshold for ROG in the project area. Therefore, this impact is considered significant and unavoidable.

Implementing Mitigation Measure O-4 would reduce this impact, but not to a less-than-significant level. However, if the project description were modified to reduce the number of recreation facilities built on the DW project islands, this impact could be reduced to a less-than-significant level.

Mitigation Measure O-4: Coordinate with Local Air Districts to Reduce or Offset Emissions. This mitigation measure is described above under "Impacts and Mitigation Measures of Alternative 1".

Impact O-14: Increase in NO_x Emissions on the DW Project Islands during Project Operation. As shown in Table 3O-1, implementation of Alternative 3 would generate 6,883 ppd of NO_x on all four project islands during an average year of operation. Under existing conditions, approximately 459 ppd of NO_x are generated. The difference between Alternative 3 and existing NO_x emissions is 6,424 ppd. This increase in NO_x emissions would be generated by pumping and recreational activities associated with Alternative 3. This increase is greater than the 55-ppd threshold for ROG in the project area. Therefore, this impact is considered significant and unavoidable.

Implementing Mitigation Measure O-4 would reduce this impact, but not to a less-than-significant level. However, if the project description were modified to reduce the number of recreation facilities built on the DW project islands, this impact could be reduced to a less-than-significant level.

Mitigation Measure O-4 : Coordinate with Local Air Districts to Reduce or Offset Emissions. This mitigation measure is described above under "Impacts and Mitigation Measures of Alternative 1".

PM10 Emissions

On Bacon Island, implementation of Alternative 3 would generate 1,802 ppd of PM10 during the 1.5-year construction period and 8 ppd of PM10 during an average year of operation. On Webb Tract, implementation of Alternative 3 would generate 1,800 ppd of PM10 during the 1.5-year construction period and 8 ppd of PM10 during an average year of operation. On Bouldin Island, implementation of Alternative 3 would generate 1,438 ppd of PM10 during the 2.5-year construction period and 8 ppd of PM10 during an average year of operation. On Holland Tract, implementation of Alternative 3 would generate 1,385 ppd of PM10 during the 1.5-year construction period and 8 ppd of PM10 during an average year of operation.

Summary of Project Impacts and Recommended Mitigation Measures

Impact O-15: Increase in PM10 Emissions on the DW Project Islands during Construction. As shown in Table 3O-1, implementation of Alternative 3 would generate 6,425 ppd of PM10 for all four project islands during the construction period. Therefore, under the worst-case scenario, there would be a 6,425-ppd increase in PM10 emissions for all four project islands during project construction. This increase is greater than the 82-ppd threshold for PM10 in the project area. Therefore, this impact is considered significant.

Implementing Mitigation Measures O-1, O-2, and O-3 would reduce construction-related PM10 emissions by less than 5%. Implementing Mitigation Measure O-5 would result in a reduction of approximately 37%. (SMAQMD 1994.) The combination of these reductions would not be enough to reduce Impact O-7 to a less-than-significant level. Therefore, this impact is considered significant and unavoidable.

Mitigation Measure O-1: Perform Routine Maintenance of Construction Equipment

Mitigation Measure O-2: Choose Borrow Sites Close to Fill Locations

Mitigation Measure O-3: Prohibit Unnecessary Idling of Construction Equipment Engines

Mitigation Measure O-5: Implement Construction Practices That Reduce Generation of Particulate Matter

Impact O-16: Decrease in PM10 Emissions on the DW Project Islands during Project Operation. As shown in Table 3O-1, implementation of Alternative 3 would generate 31 ppd of PM10 for all four project islands during an average year of operation. Under existing conditions, approximately 32,143 ppd of PM10 are generated. The difference between Alternative 3 and existing PM10 emissions is 32,112 ppd. This great decrease in PM10 emissions would result from the discontinuation of agricultural activities under Alternative 3. This agriculture-related decrease in PM10 emissions is much more than enough to offset the relatively minor increase in PM10 emissions generated by pumping and recreational activities associated with Alternative 3. Emission levels related to agricultural activities are much higher for PM10 than for other pollutants because PM10 is generated by ground disturbance as well as by fuel combustion. Furthermore, ground disturbance emits a far greater amount of PM10 than combustion does. This decrease is greater than the 82-ppd threshold for PM10 in the project area. Therefore, this impact is considered beneficial.

Mitigation. No mitigation is required.

IMPACTS AND MITIGATION MEASURES OF THE NO-PROJECT ALTERNATIVE

Because the No-Project Alternative would not involve any construction, only operational impacts are discussed in this section. Operation of the No-Project Alternative includes intensified agricultural activity with some increase in recreational uses compared with existing conditions. Tables O1-16 through O1-19 of Appendix O1 show CO, ROG, NO_x, and PM10 emissions for the No-Project Alternative in detail.

The project applicant would not be required to implement mitigation measures if the No-Project Alternative were selected by the lead agencies. However, mitigation measures are presented for impacts of the No-Project Alternative to provide information to the reviewing agencies regarding the measures that would reduce impacts if the project applicant implemented a project that required no federal or state agency approvals. This information would allow the reviewing agencies to make a more realistic comparison of the DW project alternatives, including implementation of recommended mitigation measures, with the No-Project Alternative.

Carbon Monoxide Emissions

On Bacon Island, implementation of the No-Project Alternative would generate 1,561 ppd of CO during an average year of operation. On Webb Tract, implementation of the No-Project Alternative would generate 984 ppd of CO during an average year of operation. On Bouldin Island, implementation of the No-Project Alternative would generate 1,106 ppd of CO during an average year of operation. On Holland Tract, implementation of the No-Project Alternative would generate 563 ppd of CO during an average year of operation.

Summary of Project Impacts and Recommended Mitigation Measures

Increase in CO Emissions on the DW Project Islands. As shown in Table 3O-1, implementation of the No-Project Alternative would generate 4,215 ppd of CO on all four project islands during an average year of operation. Under existing conditions, approximately 1,554 ppd of CO are generated. The difference between estimated emissions for the No-Project Alternative and existing CO emissions is 2,661 ppd. This increase in emissions is attributable to the increase in recreational and agricultural activities associated with the No-Project Alternative.

Ozone Precursor Emissions

On Bacon Island, implementation of the No-Project Alternative would generate 89 ppd of ROG and 271 ppd of NO_x during an average year of operation. On Webb Tract, implementation of the No-Project Alternative would generate 84 ppd of ROG and 345 ppd of NO_x during an average year of operation. On Bouldin Island, implementation of the No-Project Alternative would generate 95 ppd of ROG and 389 ppd of NO_x during an average year of operation. On Holland Tract, implementation of the No-Project Alternative would generate 48 ppd of ROG and 194 ppd of NO_x during an average year of operation.

Summary of Project Impacts and Recommended Mitigation Measures

Increase in ROG Emissions on the DW Project Islands. As shown in Table 3O-1, implementation of the No-Project Alternative would generate 315 ppd of ROG for all four project islands during an average year of operation. Under existing conditions, approximately 116 ppd of ROG are generated. The difference between estimated ROG emissions under the No-Project Alternative and existing conditions is 199 ppd. This increase in emissions is attributable to the increase in recreational and agricultural activities associated with the No-Project Alternative.

Increase in NO_x Emissions on the DW Project Islands. As shown in Table 3O-1, implementation of the No-Project Alternative would generate 1,198 ppd of NO_x on all four project islands during an average year of operation. Under existing conditions, approximately 459 ppd of NO_x are generated. The difference between estimated NO_x emissions under the No-Project Alternative and existing conditions is 739 ppd. This increase in emissions is attributable to the increase in recreational and agricultural activities associated with the No-Project Alternative.

PM10 Emissions

On Bacon Island, implementation of the No-Project Alternative would generate 26,432 ppd of PM10 during an average year of operation. On Webb Tract, implementation of the No-Project Alternative would generate 26,835 ppd of PM10 during an average year of operation. On Bouldin Island, implementation of the No-Project Alternative would generate 12,271 ppd of PM10 during an average year of operation. On Holland Tract, implementation of the No-Project Alternative would generate 16,105 ppd of PM10 during an average year of operation.

Summary of Project Impacts and Recommended Mitigation Measures

Increase in PM10 Emissions on the DW Project Islands. As shown in Table 3O-1, implementation of the No-Project Alternative would generate 81,643 ppd of PM10 for all four project islands during an average year of operation. Under existing conditions, approximately 32,143 ppd of PM10 are generated. The difference between estimated PM10 emissions under the No-Project Alternative and existing conditions is 49,500 ppd. This increase in emissions is attributable to the increase in agricultural activities that would be associated with the No-Project Alternative. Recreation vehicles would contribute a negligible amount of PM10 under the No-Project Alternative. The reason that this increase in PM10 emissions would be so great is that PM10 emission levels generated by ground disturbance tend to be very high because of the intensity of such activity and the ease with which dust is lifted by such activity.

CUMULATIVE IMPACTS

Cumulative impacts are the result of the incremental impacts of the proposed action when added to other past, present, and reasonably foreseeable future actions. The following discussion considers those impacts that may contribute cumulatively to impacts on air quality in the vicinity of the DW project islands.

Cumulative Impacts, Including Impacts of Alternative 1

Because prevailing winds blow many pollutants from the Delta into the Central Valley, air pollutants generated by the DW project and other Delta projects would contribute to air quality problems existing throughout the Central Valley area and would add to pollutant levels in the Delta. Mobile sources are the primary cause of cumulative ozone precursor and CO emissions in the region, and agricultural activity is the primary cause of PM10 emissions in the Delta area.

Boat and automobile traffic associated with recreational use of the four DW project islands would be the principal source of air pollutants during project operations (see Appendix O1, "Air Quality Monitoring Data and Pollutant Emissions under Existing Conditions and the Delta Wetlands Project Alternatives"). Implementing Alternative 1 would reduce agricultural production on the DW project islands, thereby reducing PM10 emissions during project operations. Therefore, the cumulative analysis focuses on present and future projects or conditions that would contribute to CO, ROG, and NO_x emissions in the vicinity of the DW project islands.

Current and planned recreation facilities in the Delta generate boat and automobile traffic in the vicinity of the DW project islands. The Delta currently supports more than 120 commercial recreation facilities (marinas), 20 public facilities, and approximately 20 private recreation associations (DWR 1993). Recreation areas support boat launching, boat docking, fishing, camping, and other activities (see Chapter 3J, "Recreation and Visual Resources"). Figure 3J-1 in Chapter 3J shows existing Delta recreational facilities located in the vicinity of the DW project islands. Future marina and recreation development will most likely occur to support population growth in the Sacramento, Stockton, and Bay Area regions. Currently, few new or expanded recreation facilities (i.e., marinas) are planned in the vicinity of the DW project islands. Recently approved or proposed recreation development projects include the expansion of the Harbor Marina and the Willow Berm Marina on Andrus Island in Sacramento County (Sacramento County Department of Environmental Review and Assessment 1995a, 1995b), approved development of recreational vehicle sites at the Tower Park Marina on Terminous Tract in San Joaquin County (Keranen pers. comm.), and proposed development of a 25-berth marina on the north end of Bethel Island and possible expansion of marina facilities on the south end of Holland Tract in Contra Costa County (Drake pers. comm.). Implementation of recreation facilities proposed under Alternative 1, in addition to existing recreational and residential development and other new recreation projects in the Delta, would increase cumulative mobile source emissions generated by automobile and boat traffic.

Impact O-17: Increase in Cumulative Production of Ozone Precursors and CO in the Delta. Implementation of Alternative 1 in conjunction with cumulative development and increased recreation use in the Delta would increase the production of ozone precursors (ROG and NO_x) and CO over existing levels. This impact is considered significant and unavoidable.

Implementing Mitigation Measure O-4 would reduce this impact, but not to a less-than-significant level. However, if the project description were modified to reduce the number of recreation facilities built on the DW project islands, this impact could be reduced to a less-than-significant level.

Mitigation Measure O-4: Coordinate with Local Air Districts to Reduce or Offset Emissions. This mitigation measure is described above under "Impacts and Mitigation Measures of Alternative 1".

Cumulative Impacts, Including Impacts of Alternative 2

The cumulative impacts of this alternative would be the same as those described for Alternative 1.

Cumulative Impacts, Including Impacts of Alternative 3

The cumulative impacts of this alternative would be the same as those described for Alternative 1.

Cumulative Impacts, Including Impacts of the No-Project Alternative

By increasing recreational and agricultural activities on the DW project islands, implementation of the No-Project Alternative would contribute to air pollutant emissions in the project vicinity.

Increase in Cumulative Production of Ozone Precursors, CO, and PM10 in the Delta. Implementation of the No-Project Alternative in conjunction with existing recreational and agricultural uses would increase cumulative emissions of CO, ROG, and NO_x and levels of PM10 generated in the Delta.

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Table 3O-1. Pollutant Emissions under Existing Conditions and DW Project Alternatives (Pounds per Day)

Pollutant	Existing Conditions 1993	Alternative 1 2020		Alternative 3 2020		No-Project Alternative 2020
		Construction	Operation	Construction	Operation	
CO	1,554	897	16,813	1,842	17,608	4,215
ROG	116	304	3,210	637	3,378	315
NO_x	459	1,991	6,459	4,172	6,883	1,198
PM10	32,143	6,990	6,987	6,425	31	81,643

Notes: Emissions under Alternative 2 would be almost identical to those shown for Alternative 1.

Construction emissions would continue during the period of construction, which is 1.5 years, except on Bouldin Island under Alternative 3, in which case it is 2.5 years.

Sources: Appendix O1, Tables O1-4 through O1-19.

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Table 3O-2. Total Pollutant Emissions Used for Conformity Screening for Alternative 1 (Tons per Year)

	San Joaquin County					Contra Costa County				
	Existing Conditions	Alternative 1 Construction	Alternative 1 Operation	Construction Minus Existing	Operation Minus Existing	Existing Conditions	Alternative 1 Construction	Alternative 1 Operation	Construction Minus Existing	Operation Minus Existing
ROG	8	23	55	15	47	6	15	46	9	40
NO_x	31	167	128	136	97	26	82	114	56	88
PM10	2,113	477	331	(1,636)	(1,782)	604	397	544	(207)	(60)

Notes: Emissions under Alternative 2 would be almost identical to those shown for Alternative 1.

These quantities were calculated from the daily emission values shown in Appendix O1, based on assumptions of 250 days per year of agricultural activity; 365 days per year of water pumping and boating; and 47 or 86 days per year of hunting, depending on alternative and island.

De minimis thresholds for this project are 100 tons per year of ROG, 50 tons per year of NO_x, and 70 tons per year of PM10. See text for further explanations.

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Table 30-3. Total Pollutant Emissions Used for Conformity Screening for Alternative 3 (Tons per Year)

	San Joaquin County					Contra Costa County				
	Existing Conditions	Alternative 3 Construction	Alternative 3 Operation	Construction Minus Existing	Operation Minus Existing	Existing Conditions	Alternative 3 Construction	Alternative 3 Operation	Construction Minus Existing	Operation Minus Existing
ROG	8	59	84	51	76	6	21	76	15	70
NO_x	31	426	195	395	164	26	95	180	69	154
PM10	2,113	405	3	(1,708)	(2,110)	604	398	3	(206)	(601)

Notes: These quantities were calculated from the daily emission values shown in Appendix O1, based on assumptions of 250 days per year of agricultural activity; 365 days per year of water pumping and boating; and 47 or 86 days per year of hunting, depending on alternative and island.

De minimis thresholds for this project are 100 tons per year of ROG, 50 tons per year of NO_x and 70 tons per year of PM10. See text for further explanations.

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